Governor's Upper Yellowstone River Task Force
Meeting Summary
February 11, 2003
Yellowstone Motor Inn
Meeting began at 7:00 p.m.

I. Introductions

Members Present:

John Bailey, Chair	Andy Dana	Ellen Woodbury
Dave Haug, Vice Chair	Brant Oswald	Jim Woodhull
Roy Aserlind		

Frank Preite, USFS Ex-Officio	Stan Sternberg, MDT Ex-Officio
Robert Ray, MT DEQ Ex-Officio	Laurence Siroky, DNRC Ex-Officio
Allan Steinle, Corps Ex-Officio	Joel Tohtz, FWP Ex-Officio

Others Present:

Liz Galli-Noble, Coordinator	Karl Biastoch	Bill Moser	Rob Hazelwood
Kelly Wade, Secretary	Burt Williams	Peter Husby	George Jordan
Duncan Patten, TAC Chair	Thomas Hallin	Jim Barrett	Denine Schmitz
Daryl Smith	Chuck Dalby	DeWitt Dominick	Kay Blehm
Karin Boyd	Jim Robinson	Linda Phillips	Mike Gilbert
Scott Powell	Altan Soykan	Mike Merigliano	Monica Brelsford

II. Prior Meeting Minutes

John Bailey: In review of the minutes from our January 7th and 21st Task Force meetings, there were some corrections made to the January 7th minutes, so we were unable to take action on them at our last meeting. We will address the two sets of minutes separately. We need to review the January 7th minutes first. Any discussion on the January 7th minutes; any motions?

> **Dave Haug moved to approve the January 7th, 2003 minutes as written. Brant Oswald seconded the motion. The motion passed unanimously.**

Any discussion on the January 21st minutes; any motions?

> **Dave Haug moved to approve the January 21st, 2003 minutes as written. Ellen Woodbury seconded the motion. The motion passed unanimously.**

III. Financial Updates

EXPENDED GRANTS			
Grant Name	**Completed**	**Amount**	**Study Component**
DNRC Watershed Planning Assistance Grant	6/30/99	2,100.00	Physical Features Inventory
DNRC HB223 Grant	7/30/99	10,000.00	Aerial photography
DNRC Riparian/Wetlands Educational Grant	6/30/00	960.99	*Hydrologic Response to the 1988 Fires* Workshop
DEQ 319 Grant (1st)	9/30/00	40,000.00	Coordinator position
DNRC Watershed Planning Assistance Grant	1/31/01	10,000.00	Watershed Land Use Study
DEQ Start-Up Grant	6/26/01	49,138.00	Coordinator position, Admin secretary, additional cross-sections, operating expenses.
DNRC HB223	10/1/01	6,500.00	Riparian Trend Analysis
BLM Funding	10/26/01	10,000.00	Wildlife Study
DEQ 319 Grant (2nd)	3/21/02	58,000.00	Coordinator position
DEQ 319 Grant (3rd)	9/30/02	44,000.00	Coordinator position
EPA RGI Grant	12/20/02	30,000.00	Geomorphology study

CURRENT GRANTS			
Grant Name	**Amount**	**Spent**	**Remaining Balance**
DNRC RDGP Grant (expires 7/03)	299,940.00	288,621.63	11,318.37
DEQ 319 Grant (4th) (expires 3/04)	122,200.00	35,235.60	86,964.40

John Bailey: Any discussion on the financial update?
I want to share something that Liz provided me earlier this week: a break down of projected 319 funding expenditures for the remainder of the project. Her budget numbers were projected through November 2003. Is that correct?

Liz Galli-Noble: Yes.

John Bailey: And how much money was left after that? I mean ballpark figures.

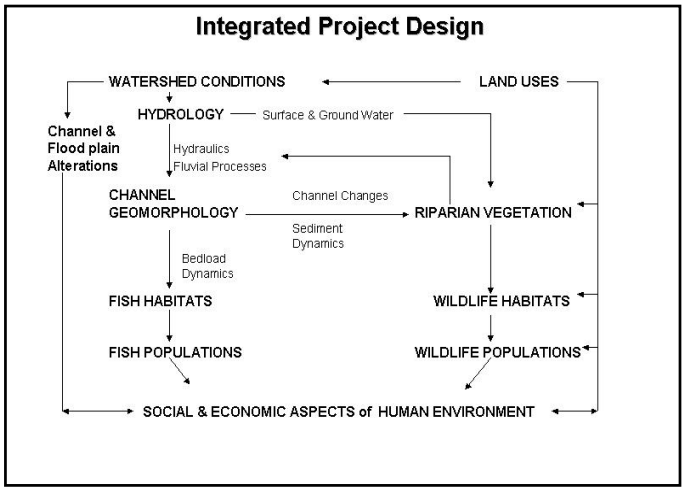
Liz Galli-Noble: I ran numbers for my position, all the taxes, benefits, payouts for sick and annual leave, the Task Force office, all of our standard mailings and printings, and approximately $15,000 of the $87,000 is remaining. That is, $15,000 remains in the budget outside of our operations, mailings, office, phones, computers, and my position. That's through November 30th, 2003.

John Bailey: Liz pulled this together and showed it to me. I didn't ask her. But we need to be aware of where we stand. We said we weren't going to go looking for more money, but if we get ambitious, we're going to have to. I just want the Task Force to be aware of our financial situation.

IV. Research Presentation #7. Wildlife (Bird) Study – Riparian Habitat Dynamics and Wildlife along the Upper Yellowstone River

1. Meeting Format and Introductions

John Bailey: Before I introduce Duncan Patten, who will introduce the researchers, I want to go over the ground rules that we use for all of our research presentations. During the presentation, there will be no questions, no interruptions. At the end of the researcher's presentation, then the Task Force will be the first allowed to ask questions. They must be specific to the research. If it is speculative, it'll be cut off, and after that, then we open up questions from the public. And again, the public may ask specific questions of the research, but if you start going outside that research, you'd be cut off. These researchers are here to talk about their findings, not to speculate. Then we will go into the second part of the meeting, where we're going to talk in a broad spectrum of what the research may or may not mean. We'll have a discussion. There's a real distinction here. The researchers don't even have to stay for that part of the meeting. We've had some meetings in the past where we kept asking the researchers questions, and that's really not supposed to be a part of the discussion session. And again, in that format, the Task Force will be the ones to speak first, and after we've had that process, we will open it up to the audience. But there is a real distinction, and I want to point it out both to the Task Force and the audience, that the first part is for asking questions of the research, and when we're done with that, we move into more discussion, where we might start speculating (how we might use this data). But we're not asking the researchers to speculate. So I just want to reiterate the rules. It is an important part of our process, and it's worked well when we've done it that way. I think it's moved us quite a long way. I'd like to introduce Duncan Patten, who will introduce the researchers.



Duncan Patten: I'm going to grab my integrated design diagram (see figure at right), because in a sense we're backtracking a little bit. Two presentations ago, we were talking about riparian vegetation, and then because of scheduling, we

went over to fish populations, and we'll be coming back next time to fish habitat. So some of these aren't fitting in order, but the reason for bringing this up here, is that the wildlife habitats and wildlife population studies basically build in part on the riparian presentation. You can see the flow here, and obviously we put humans at the bottom, and they really are a third dimension to this. So the presentation tonight really, as I recall, has two parts. One is the study of birds (avian populations) relative to riparian vegetation, but we asked Andy Hansen and his group to also take a look at some older photographs and some newer photographs and basically try to see what the riparian system was and the changes, and can you make some kind of projections and possibility of changing avian populations. So, the research was conducted by Dr. Andy Hansen and Dr. Jay Rotella in the Ecology Department at Montana State University, and the two graduate students who are working on it now are Lurah Klaas and Danielle Gryskiewicz. I'm not sure who's going to be speaking, Andy's here and the two students are here, Jay is not unless he's hiding somewhere. Andy, maybe you can sort of take over the introductions.

2. Research Presentation #7. Wildlife (Bird) Study
See *Attachment A. Riparian Habitat Dynamics and Wildlife along the Upper Yellowstone River* PowerPoint presentation.

Note: This presentation was videotaped and may be viewed upon request. Contact the Task Force coordinator if you wish to borrow the videotape.

3. Question and Answer Session

John Bailey: Now we'll open it up to the Task Force, to ask questions of the research. And I would like to start us off. I want to make sure that I understand the numbers on your graphs. When I will look at the "Bird Species Richness" graph [slide 40], and on the left side it goes 2000, 4000 and up to 20,000. I don't understand what some of these mean, and I assume a lot of people don't know what it means. I just don't see the results on your graphs; I don't know how to read them.

Andy Hansen: Good, well let's bring that Richness graph up and look at it.
So, one question that John had was, "What are these numbers?" This is the average number of species that were tallied at each of these seral stages, going from 2, 4, up to a maximum of about 16 species. We're showing three significant digits here, but that's really just an error in formatting. Okay, and then these are the different seral stages, so this is basically saying that, on average, when our research team would go out and do a point count in this mature cottonwood shrub type, they would get an average of about 16 species sampled. Sometimes it would be a little less and sometimes a little more, and that's what this error bar is showing.

Duncan Patten: Andy, maybe everybody understood what the yellow bars indicate, but would you go over it anyway.

Andy Hansen: So, one question is when you can see that, on average, there were more species in this type than this type. But statistics deal with the question of how much of that could be due just to chance alone. And so statistical analyses are ways of quantifying the probability that these results are significantly different. There's more than a 95 percent chance that they are different, and these yellow bars basically are products of the statistical analysis; in that, this yellow bar is saying that these two types [under the yellow bar] are not different from themselves, but they are different from all the other seral stages. So basically the conclusion is that these two types are significantly higher in richness than any of the other types.

John Bailey: Okay, I get it. Now, that's all three river types together?

Andy Hansen: Yes, this is actually just the braided reaches, where each of the habitat types was well represented.

John Bailey: How much then did those numbers change in the other areas?

Andy Hansen: I didn't go into that because they are actually very similar. In the moderately confined reach types for the seral stages that we could sample adequately, they are similar results. Not all these seral stages are well represented in the moderately confined, so we couldn't do as adequate a comparison. But at the level we could do it, the findings were fairly similar.

John Bailey: Thank you. So the correlation exists, so that if it's important in one area, it's just as important in another.

Andy Hansen: That's right.

Dave Haug: My first question is on the counting methods. You noted that you count all birds within 40 meters, visually and also from hearing them. And my question relates to the fact that, when you are hearing in different types of vegetation, whether you're in heavy, dense vegetation or a meadow or something where you hear a lot farther away, how do you factor in the accuracy or how do you make sure you have a consistent number of birds in the exact confines, because of the difference of hearing? I mean I can see visually, but hearing?

Andy Hansen: There is a whole set of techniques to quantify that detectability as a function of distance. You're right on; you can hear some birds further in some habitat types than others. We've used those techniques over in our previous study to quantify that detection distance, if you will. And for all the species it was farther than the 40 meters that we have here. So, based on that, we were able to assume detectability out to that distance. Now, in other studies where we sample out 100 meters, then we have to use correction functions to adjust for that.

Dave Haug: I've got another question that may be related to the overall study. Basically we're using these numbers, the bird numbers, to go from birds to all species of wildlife, as I interpret it. Is that correct? So eventually we should be able to generate numbers for other species; is that kind of where we are going with this? We should be able to speculate this out?

Andy Hansen: It's not unlike if you plant a garden in the spring, you kind of want to know what's going to grow well and what isn't. And you might plant some peas and other cold weather crops, and compare those to zucchini. And in the end you conclude that in our environment, the cold weather stuff does better. You didn't actually plant cabbages, so you don't really know, but based on the peas, you think you know something. In other words, we can only draw a strong inference about what we actually sampled. We can then compare these results to the results of other studies—studies that had much larger budgets and bigger areas and looked across many different groups. And I think the safe conclusion is that these findings hold for birds and shrubs. We don't really know how well they hold for other types of wildlife, but we expect that they are reasonably good indicators, in general, on species richness. You kind of get what we pay for, right? We sampled as many species as we could for the money, which allows us to have some confidence that these general patterns hold for other species. But without actually sampling those other species, we don't know for sure.

Dave Haug: That's what I wanted to see, if you could extrapolate out into other wildlife species. So then, if you had done that, based on other studies, how we could compare them for the predation of animals, species variation? This may be going beyond the reach of what your study can really do.

Andy Hansen: Yeah, I think it is. Hopefully, all these studies take us a ways down the path from what we knew before; but they open up a whole bunch more questions, too. So we still have a lot more to learn.

Roy Aserlind: My question relates to your sampling procedure. You started at dawn, and then did a 10-minute sample. Now, are we talking about a time sampling technique, in other words, you would do your 10-minute sample, then what?

Lurah Klaas: It depends on the amount of points that you're going to sample in a morning.

Roy Aserlind: But you would move from location to location?

Lurah Klaas: Exactly.

Roy Aserlind: Ten minutes at each location. You didn't do more than one sampling within one location in one period, then? In other words, did you do a 10-minute sample in Location A, then during the course of your moving around, you'd come back and do a 10-minute sample in Location A two hours later?

Lurah Klaas: No. It's different. How we did it is we had three observers during the field season and there were 130 points. So, the goal was for each observer to visit those 130 points separately.

Roy Aserlind: Oh. Did you have three observers look at the same point, at the same time?

Lurah Klaas: Yes, but there was a time spacing there of about 10 days at least, so we had a rotation.

Roy Aserlind: Was there any necessity you felt for any kind of a measurement of interrelated reliability? In other words, you may have heard a veery, but nobody else heard it?

Lurah Klaas: Well, I don't really know the answer to that. Prior to the field season, we had an intensive training; we spent two weeks going out every morning birding. I consider myself an expert, Danielle does as well, and we had one more person, who worked with us and we trained him. You listen to bird CDs, you go out every morning, and then we started doing mock census to test ourselves. Just making sure that everybody was up to par; that's how we did that. Did that answer your question?

Roy Aserlind: Okay.

Andy Hansen: Let me follow up on that too. So they worked really hard to be consistent by training together, but still Lurah gets more birds than the rest of us, for sure. And so that is why we randomized observers among the points. Basically, each observer visited each point, so that there was no particular bias. We didn't only send Lurah to the cottonwood shrub, we spread everybody among all the habitat types to try to control any bias that may be there, due to observer abilities.

Roy Aserlind: Okay. Then another question, in all the birds that you did mention, I never saw the word magpie. Why would that be?

Andy Hansen: Well, they tend to be generalists, so they show up in most of these habitats and really don't specialize in any one. They are actually quite abundant.

Roy Aserlind: Oh, okay.

Joel Tohtz: Just a point of personal interest, in my sampling of fish and the number of species found, I've encountered a Mud Minnow and an Atlantic Blowfish, which is a saltwater species, in the Yellowstone River. I'm just wondering, in your investigation did you come up with any weird "outliers"?

Lurah Klaas: Actually, there was one species that I counted out on a gravel bar, and that was a Rose-Breasted Grosbeak, which does not typically live in this area. That was the most unusual, and I did report that to Montana Audubon about the rare species bird alert. That was about it though.

John Bailey: When we were first talking about doing this study, one of the reasons this was brought up, was the extensive research you've done in the area. You elude to some comparisons, but you don't give us the comparisons. There seems to be this data sitting there that we could probably use, if you would give it to us.

Andy Hansen: We'll do that in the report; in other words, we'll plot the Yellowstone results on the same sort of graphs that we plotted the results from that other previous study. Now, I had hoped to do that already, but it turns out that it's going to take a lot of data analysis to make it happen. This is because we

used a 100-meter sampling radius in that previous study. So, we've got to go way back to the beginning of our data analysis and redo it all for the Gallatin, in order to make it comparable with the Yellowstone. I would like to have had that done, but it just hasn't happened yet. In other words, the results you get depend upon the area that you sample. We want to do it right and carefully control for the area sampled, so that it, in fact, is a valid comparison. Lurah can talk about it—she sampled extensively in both study areas—the extent to which cottonwood habitats support more or fewer species than these other places. Is that of interest?

John Bailey: Right, but tonight you eluded that the 1998 and the1948 was very high. What did you get in the other areas, for number of species?

Andy Hansen: I can't make a direct comparison because we sampled a bigger area in the past study. So, specifically, with that larger sampling radius, our cottonwoods had an average of about 30 species in that previous study. And for the Yellowstone there were about 16; but we sampled an area that was about 60 to 70 percent larger there than here. So, I'm not trying to be evasive, I simply don't have the specific comparisons. There's something called the "species area effect"—the bigger area you sample, the more species you get. So, we'll get that to you, we'll get that analysis done. Our feeling is that these habitats—this mature cottonwood shrub—is probably just about equivalent to the mature cottonwood shrub in those other three river systems; but there's much more of the mature cottonwood with an herbaceous understory here on the Yellowstone than is the case in those other river systems, and that somewhat lowers the species richness. I'm guessing, I think it's really pretty interesting, that the water table is a little lower in the Yellowstone River area than in the Gallatin. And therefore the vegetation has to reach another two meters down to get moisture, and so there's a little bit less primary productivity, and all those plants are growing a little more slowly, and there's perhaps fewer invertebrates, and hence, less food for birds. So, I think the Yellowstone might be a little bit different from the Gallatin in being not quite as rich, due to those reasons. But the cottonwood habitat is still very rich compared to Douglas fir, compared to lodge pole pine, etc. As I said, we'll be able to get you the specific numbers on that.

Duncan Patten: Andy, could you do that somewhat simply by using relative numbers, rather than actual numbers? In other words, percentage of totals or things like that, rather than using your actual numbers of species, or will that skew the end interpretation?

Andy Hansen: Well, we didn't sample sagebrush, lodge pole pine, or Douglas fir here on the Yellowstone, so we can't compare the cottonwood to the other types, like we did elsewhere. It wasn't part of this study.

Duncan Patten: No, I understand that very well. I was trying to come up with an easy way to put the two together, where you start using relative numbers, rather than actual. But if you're dealing with a whole bunch of different habitat types that would complicate things.

Andy Hansen: John, could you please ask more about what we think is going on, because we probably have a pretty good handle on that, and then we'll be able to substantiate that with actual data.

John Bailey: When you made the comment that on the Gallatin you're losing the cottonwood habitat, you were eluding to your other studies. But if we're to try to take this study and make recommendations, we have to have some understanding of both.

Andy Hansen: The habitat that's being lost on the Gallatin is largely off the main river channel and it's due to the irrigation network that was put in at the turn-of-the-century. So, for example, Hyalite Creek comes down out of the mountains, and it used to be able to wander across the Gallatin Valley by Bozeman, and it supported a variety of cottonwood stands there. But a fair amount of the water from that stream was diverted to the irrigation ditches and so those cottonwoods became stranded, if you will. And now, 100 years later, they are pretty much senescing and dying and disappearing. You can actually see skeletons of old cottonwoods out in what used to be active channels, but that no longer are active channels. Now, that's very relevant here. It follows that if these flooding regimes are basically removed, these riparian communities disappear, based on what's been learned over there. Now, we haven't seen

that kind of phenomenon here, in this Yellowstone study, but we can certainly in our final report draw from what is happening in those other places and in ways to address how relevant that might be here. So, to be specific, the actual cottonwood stands that we sampled in the Gallatin were in the active flood plain that is still flooding and banging around, a lot like the Yellowstone. It's not the mainstem Gallatin that's lost the cottonwood, it's Hyalite, it's Cottonwood Creek, it's all the major tribs that flow into it that have lost the cottonwood.

Duncan Patten: Andy, why don't I give you a "what if?" You have your three different reach types, and let's say for some reason your braided reach type (through flooding changes or what have you) became your moderate, so that they mimicked your moderately constrained type; would you expect a decline in species within the Paradise Valley in those habitats?

Andy Hansen: I think that's what ecological theory would predict, because the size of the remaining habitats—their aerial extent—would get smaller, based on what we see out here now. And as a habitat gets smaller, there's some minimum size of a cottonwood stand below which a veery no longer would be found within it. Now there's a whole bunch of research from around the world on habitat fragmentation, as you know, that leads to that conclusion. None of those studies have actually been done in the northern end of Greater Yellowstone here, but they have been done on the Snake River down by Jackson, and that finding held there. In other words, the size of the stand matters to some species, and so alteration of the actual area of a particular stand could translate into influencing different species. That was way beyond what we could do here, so we didn't address that.

Duncan Patten: I'm just asking you to speculate, I guess, but you're speculating based on other theory, ecological theory.

Andy Dana: A couple of thoughts occurred to me, one is with the abundance of the cottonwood herbaceous habitat type on the Yellowstone. Do you have any thoughts about how vulnerable those habitats are to noxious weed invasion, and what that might do to the species richness? In fact, did you notice any heavily infested areas that were less diverse?

Lurah Klaas: I can't think offhand, I didn't notice a lot of Russian Olive, which is an exotic.

Andy Dana: I'm thinking of knapweed.

Lurah Klaas: Yeah, well of course the gravel bars are full of it, but other than that I can't really recall right off hand.

Andy Dana: Well, I've noticed it, just anecdotally, spreading into the mature cottonwood herbaceous regimes along the river channels.

Andy Hansen: In other places where that question has been studied, those studies find that it's often these very rich habitats that are most invadable, oddly enough, by exotics. A comprehensive set of studies from Colorado found that it was the aspen and cottonwood stands that—of all the different stand types—had the highest proportion of non-native species.
The role of juniper in these stands is something I wonder about. Of course, I don't know really what's going on, but it's amazingly prevalent in all these later seral stages. Of course, it's a species that occurred here naturally, but whether its abundance is changing isn't so clear. Maybe Mike Merigliano has a better sense of that.

Andy Dana: One other question, sort of getting at what Duncan was asking. Would it be possible to take a look at some of the areas that have had historic bank stabilization—that is, rip rapping—in the area, to see if there is any statistical difference between those areas and areas that haven't been affected?

Andy Hansen: That would be the ideal. When this study was formulated, that would be the natural sort of thing to do—to examine places with and without stabilization, and look at differences in river dynamics, hydrology, flooding, riparian vegetation and all that. My understanding is that, and I think this is right, that

this stretch of the river just doesn't offer a good "with and without" set of independent areas. In other words, the stabilization that's occurred is kind of intermingled with places where it hasn't occurred. And there are no long, or sufficiently long reaches that are controlled or others that are not controlled. In talking with George Jordan (USFWS) about extending the study downriver, he thinks that there are good opportunities there to do just that type of comparison.

Allan Steinle: Andy, I remember you talking earlier, and you described some of your previous work on the Gallatin, and you spoke in terms of "sources" and "sinks". Where you thought that the riparian areas were sources (adding birds to the population) and that some of the upland areas were sinks (actually losing birds from the population). I think you said that, for some species anyway, that Yellowstone National Park was more of a sink for birds. Would that type of relationship hold true then for the work on the Upper Yellowstone as well?

Andy Hansen: Now this gets a little more complicated, because so far here we've talked about where are birds most abundant. To really understand the long-term change in populations—whether populations are going to increase or decrease—you need to know how many birds there are, but you also need to know how well they're reproducing, what their mortality rate might be, and how they're moving from one place to another. Over in the Gallatin, in the previous study, there was a much larger effort that was aimed at trying to quantify reproduction, as well as abundance. That basically tripled the overall cost of the study. And what we learned from that are some really interesting things about what places might actually have lots of birds—places that have high reproduction and low mortality, and hence their populations are growing locally. And our conclusion was that probably the low elevation habitats (like along the Gallatin) for many bird species are in fact really good habitats that are producing, that have populations that are growing. And then up in Yellowstone Park, on the other hand, due to the very harsh climate there, snow can occur when these birds are nesting and wipe out nests; we think that those are probably places where population would decline based just on what's happening locally. And that that opens the possibility that the surplus of birds from the lowlands actually moves up and is a source area, if you will, for those populations that otherwise would decline in the Park. We published a couple of high profile scientific papers on that topic just in the last year. It's really important because it speaks to the fact that species within national parks might well not be able to sustain their populations if they're cut off from these source areas that are outside of the reserves. We speculate that that might well be the case for various fish species around Yellowstone, and for various large mammals. Now, how does that all play into the Yellowstone? Of course, we didn't address those population dynamics questions here, but there is no reason to think that the story is different here than over there. I suspect, my guess would be that, particularly the braided stretch of the Yellowstone River did act as population source areas in the presettlement times—to replenish populations that were at higher elevations and in harsher settings. We don't know that, but that would be the speculation. That's really important, because it says that changes in the Yellowstone flood plain are well likely to have ramifications a long ways away. We speculated as far as 60 or 100 kilometers away (40 to 60 miles) that there might be wildlife consequences to decisions that are made on the Yellowstone flood plain. I think that's the point you're driving at.

Roy Aserlind: As briefly as possible, could you differentiate between herbaceous and brush as the undergrowth?

Andy Hansen: Herbaceous is just annual growing, non-woody vegetation; typically, grasses and forbs. And then we separate the woody plants like the shrubs and the trees from that. These mature cottonwood herbaceous stands were basically those that had a heavy grass component in the understory, and not much shrub component.

Brant Oswald: I have two questions that are both mostly procedural. The first one is, why do we have the higher incidence of the mature cottonwood herbaceous? Was that the water table explanation? Why are you seeing more of it here than elsewhere?

Andy Hansen: That's my speculation, but that's not my field. Mike Merigliano would know more.

Brant Oswald: One other question that related back to John Bailey's questions about trying to relate this to earlier studies. The difference in research design going from the sampling radius of 100 meters to 40 meters; why was that done?

Andy Hansen: Well because the patches of habitat here on the Yellowstone are much smaller in size. When we sampled within cottonwood herbaceous, we wanted to be sure that the birds that we were recording were actually in that seral stage, and not in a different seral stage that was just 50 meters away. The flood plain here is just smaller in size than some of these other rivers, so we simply couldn't fit 100-meter radius plots into the different seral stages here.

Laurence Siroky: When you were counting the number of bird species, does the feeding habitat have an effect on the number of species that you count—along the river, outside of these areas where do your counts? It would be like hayfields, grainfields, pastures, and irrigated pastures, you know they all have a diversity of bugs and other kinds of things.

Andy Hansen: To some extent these birds were probably integrating over a couple of these habitat types, but these birds tend to have relatively small territories that they actively defend. On the order of a half-acre to an acre in size; that's how big a Yellow Warbler would basically stay within for feeding and for raising its young, and so forth. They tend to use fairly small patches and most of these species would mostly tend to use one of these habitat types. A few birds will use several habitats, for example the magpie, it's not tied to a particular habitat, it's an opportunistic feeder so it feeds among several habitats. When we asked which species specialized in a habitat, particularly the sort of species that came up, it was those that have these small home ranges that are pretty much habitat specialists. The American Robin is one that likes to nest in these dense, intermediate-aged cottonwood forests, but it goes and forages out in the meadows. So there is some mixed use of habitat that makes the story more complex, but that's a complexity that could be dealt with in the future.

John Bailey: I want to open it up to the public now, if you've got questions.

Bill Moser: How the study was formulated, a two-part question if I may. You go up Pine Creek 100 yards and you're now in a habitat type that is not classified here. If you go up Big Creek 300 yards, you're in a habitat type that is not classified. If you go up Mill Creek two miles, you're in another classification. How do you know that the braided reaches are the hotbeds or where these birds are going to be, if you didn't look at the tributaries of the Yellowstone? And why didn't you look at the tributaries on the Yellowstone?

Andy Hansen: So why didn't we? We wanted to be able to have large enough samples to come up with definitive answers for the places that we did sample. There is always a trade off between how many different places you can go and ask questions, and how big a sample, and how much confidence can you have in your answer. So, based on the funding available and the time available, we tried to pick habitat types and used a study design that was most relevant to the question of seral stages and flooding—long-term flooding impacts on the system. As you can see, we didn't have sufficient samples to do all we would have liked to have done in that moderately-confined reach type. And so the answer is logistics just didn't allow us to go to those other habitats and get adequate data to have strong confidence in our answers. Now, based on our work elsewhere, everything I know would say that those places would be on par (in terms of the types of birds within them) with the places we did sample, with the later seral vegetation on the mainstem river, except they're probably a little bit more in richness. So, there's studies from the Bitterroot that looked at that gradient from the mainstem up the tributaries and found that kind of effect. We had some data relevant to this in our other studies, around the Gallatin, that would say the same thing. I think I've couched my statement that the cottonwoods here are probably the hottest, saying that that's what we've found elsewhere, and there is no reason that I know of to think that it doesn't occur here. But we did not study those other types of habitats. Again, there is a limit on how many questions you can answer well.

Karen Boyd: I have a question about the changes shown through time, between 1948 and 1998. It showed cumulatively from the young stages from 1948 there was a reduction in young stages of about 10

percent, and a commensuration reduction in the mature cottonwoods of about 10 percent. Right? Of the two mature stages? And you said that wasn't particularly significant. I'm wondering, in light of the fact that there were two big rejuvenating events right before 1998, if that change might be more significant. In other words, if you had gone out in 1995, would we all be panicking right now?

Danielle Gryskiewicz: It's hard to say because, like Andy was saying, there are very basic questions that you can answer with that historical changes study. We can say what we see, but it's hard to know, particularly why we see it. The bottom line is, what we're looking for are drastic changes really, that's the scale that we looked at.

Andy Hansen: The more detailed way to do this would have been to chronicle each of the floods, and then every five years or so do this mapping again. But that was well beyond what we were able to do in this study. The rationale behind our study is: we wanted to look at the big changes, the big things over that 50-year period should have showed up. And so, our conclusion still is quite valid that regardless of exactly when the last flood occurred, there were not major deviations in that distribution of seral stages. Which kind of supports the notion that all those stages are being maintained. Now, given that there was a big flood in 1997, we would have expected maybe an increase in the early seral, and a little bit less in the older stages. Of course we don't know what the flooding regime was prior to 1948, so we're not sure that should be different. So while we did see a reduction in shrubs, which is a little bit consistent with a recent flood, we also saw that that recent flood didn't wipe out massive parts of the late seral and convert it to early seral. So we could have done this in more detail, but I think our data are adequate for the big picture message that most of these stages have been maintained in those two time periods.

Bill Moser: What did you see in terms of physical numbers of raptors, in particular, eagles?

Andy Hansen: Our methods don't really allow us to sample them quantitatively, but these guys keep a good sharp eye out. Lurah, how would you answer that?

Lurah Klaas: We saw eagles quite a bit, actually, in about every large patch of mature cottonwood. There is a nesting pair of Redtail Hawks, and a nesting pair of Great Horned Owls. So they're there, in the large patches. As far the eagles are concerned, we could just mainly see them flying by. We know where the Osprey nests are as well; that's it.

Bill Moser: Could we look forward maybe three slides and explain the Y-axis of the abundance of species charts [slides 41 to 46]?

Andy Hansen: Now we've shifted from number of species to the abundance of individual species. So for the Spotted Sandpiper this shows the number of detections of that species per census, that's per visit, that's going out for this 10 minutes, per hectare. We've averaged all the data from the three visits to each point, and the 15 or so points within the gravel bar, and we converted the number of detections to this index of the number you would observe in one census, corrected for area, so it's per hectare. We do that because now it's comparable with the results from elsewhere. Miles per hour, you know, it's just a standard metric.

John Bailey: It's almost speculative, but you brought up that we have an opportunity on the Yellowstone, because we didn't have this change over the 50 years, for more options in what we do in the future. One of the concerns I'm having is when do we cross the line that we lose? But you brought up that we have these options, so I'd like you to try to answer how you know, when as a Task Force that would be a line that would be crossed.

Andy Hansen: You won't like my answer, which is there are methods in science for addressing that, and it would involve, I think, developing computer simulation models to try to project forward in time, under different management scenarios. I make those kinds of models for the timber industry for example, to look at how habitats would change over a 50-year period under different logging scenarios. Everything that has been learned here would provide the base data for doing that kind of analysis. But of course, it's beyond what has been done so far. Unfortunately, the key science is not there, I don't think, to provide

you much guidance on the decision that you all are going to have to make. I personally don't think that we know how much bank stabilization, for example, would substantially push the flood plain away from this dynamic, steady-state equilibrium. I don't know whether expert opinion is a way to do that; I mean maybe you've been getting that kind of expert opinion in these kinds of sessions up until now, maybe that offers some insight as well. So, I'm with you that it's a tough question.

John Bailey: Well you just gave me something. We get to make recommendations, so we could recommend that if in the reaches that we think are impaired, and that if the Corps or different permitting agencies are going to do these things to some degree, that they're going to have to do what you're suggesting; and hopefully you'll put that in your final report, so we know what it is.

Duncan Patten: I'm still going to speculate, going back to John's question. Now this is part of a simulating model. If you took your mildly constrained reach, that of your middle reach area, and channelized it, you know, play Los Angeles and channelize the river, basically turned it into a constrained reach. That's a no-brainer.

Andy Hansen: Right, we all know the simple thing that this river is banging around, back and forth on the flood plain. And everything I said, in simple terms, is a result of that river being able to move around. So, if in fact, it's prevented from moving around, we're going to be losing these habitats and we're going to be supporting fewer and fewer of the species. Now, we know that, you know that, but what we don't know is—and I certainly don't know and I don't know if anybody does—to what extent does bank stabilization alter the flooding and alter the initiation of successional stages. And I don't think we know where that line is; how much could you inhibit flooding before all of a sudden you start losing valuable things. I'll go a step further. If I were in your shoes, I mean we always make decisions without adequate information. The bottom line is the less the river moves around, the more these ecological values are going to be reduced. Now, how much benefit is there to other resources and other interests, to preventing it from moving around, that comes into it too.

Duncan Patten: Those are the trade-offs.

Andy Hansen: I think to constrain the river much more is likely to set up ecological impacts. How much more, exactly what impacts, we don't know. That's just common sense, right?

Duncan Patten: The example I gave is an extreme. I said "play Los Angeles" and channelize all of it.

Andy Hansen: Right, you channelize it and you lose all the cottonwood. On the Gallatin, we lost all the cottonwoods on the streams that were dewatered.

Chuck Dalby: I just want to make one quick comment on that. I think that we will have, from the historic channel modification, you can bring that analysis, some information that we can relate to riparian trends over time. I think we can also make, both based on the hydraulic and geomorphic information that we have, some pretty good estimates of how the channel would respond to a specific type of bank management. But what is very difficult is to do that analysis in the abstract. I think we really need to go through some sort of scenario-driven, reach-specific, "what if" games to get at those answers. The other comment is, I found it pretty interesting that the 1948 to 1998 historic riparian change comparison essentially indicates that there's been a steady-state in those distributions of seral species. I think, in some channel segments, that the historic channel change analysis that DNRC is doing will support that. In a couple of other areas, I'm not sure that that will hold true. I guess one further qualification is that we can look at 1948 in any of the studies and compare it with the late 1990's and make an inference about the change or lack of change within that interval. But we have to realize that in the late 1990's there was quite a flurry of bank stabilization and permitting activity, and there's frequently a lag time in response of vegetation communities, and to an extent, the physical channel.

John Bailey: Chuck, excuse me, do you have a question? This sounds like our general discussion.

Chuck Dalby: I'm sorry John, but I thought it was important to make these clarifications and that this was my only opportunity. I'll sum it up very quickly. I think we need to be cautious about making predictions on the state of the future river, based on what we've seen between 1948/1949 to 2000, because there have been some additional changes to the river that that time period information may not reflect.

Andy Hansen: I would just say that I think those are all excellent points, and that type of more detailed analysis is indeed the type of thing that your studies really are doing. So I would certainly defer to you on those questions.

Allan Steinle: You had talked earlier about making some comparisons, and you talked about a comparison to the Gallatin River. Is that going to be part of this study then, are you going to add that?

Andy Hansen: Yes, we'll be able to compare them. The numbers, each of these measures of biodiversity, we'll be able to compare between the similar habitats in the Yellowstone and in the Gallatin, Madison, and Henry's Fork. And we'll include that in the final report that we provide the Task Force.

Allan Steinle: If you're going to make those comparisons, then, are things like climate—whether there was a drought in the time that you were counting them here versus not in the Gallatin, or whether there was some migratory impacts for the species you counted in the Gallatin in a given year—be taken into account?

Andy Hansen: Those are good points. In a given year, every year is a little different in terms of what you sample and there could well be some interannual variability that would make a comparison not 100 percent. I still think it is worth doing, and we won't really know how much uncertainty is a result of that year-to-year difference. Generally, we find there's not. Something like bird species richness, probably doesn't change much from year to year, but the abundance of any one species might change quite a bit.

Andy Dana: Don't you also need to evaluate the natural state of the Yellowstone versus the natural state of the Gallatin? I mean, this might not be as rich a basic habitat as the Gallatin or the Henry's Fork or some place like that. So, how do you control for that variability?

Andy Hansen: Clearly the comparison would be kind of a rough, pure comparison of the numbers between these two places, without the complex analysis of what really might explain those similarities or differences. Our study was focused on this system, and so we can simply compare the results to elsewhere, but we haven't done the elaborate studies that would allow us to understand that better.

Andy Dana: I guess I'm concerned about making that comparison, just presenting the raw data without any interpretation, if that's what you're proposing to do. Because people are going to take that and run with it. And I don't know that that's particularly responsible, just to lay that out there without a better explanation.

Andy Hansen: Those are excellent points for us to keep in mind. We have the benefit of having actually done this extensive sampling in both places. So we have a real feel for what is the land use in each place, and what's the underlying characteristics of the system, and where is the water table, and all that. So I think we have a good sense of what's a reasonable comparison and what isn't. And that would guide what we would do. At best, I think it's going to say that these riparian habitats here on the Yellowstone are probably fairly similar, but slightly less rich, than over there; and that's about as far as we could take it. We would then lay out hypotheses that if that's true, why it might be true? Which could then lead to follow up studies.

Andy Dana: I just would urge caution, because recommendations are going to be coming out of here, and the decisions that are going to be made over the years based on what comes from the Task Force are going to be political decisions. And unless you're very careful in the way you present this comparison, it could have some major ramifications on decisions: the debate, public debate.

Andy Hansen: How about you and John both respond to that, because you now understand the nature of the issue from both places. John has been advocating this comparison and you're saying be careful, so is middle of the road "do it, but do it cautiously"? Is that what you're recommending?

Andy Dana: I wouldn't do it if you are not confident of the results, is my recommendation. I mean, if you don't have the scientific basis to make that comparison, I don't know that you have to, as a scientist. I would caution you, I guess.

Andy Hansen: Well, it's not uncommon to say "this is what the detailed studies revealed for this place, now, let's go to the literature and see what was learned elsewhere and see how similar or different these findings are." That's quite commonly done. Now, what isn't done is to say, "and we're sure that the differences are due to the following." We didn't study that, so we don't know what they're due to. We would typically say "these results are either similar to, or different than, previous studies" and we might offer, we might speculate on why that is. We might offer hypotheses, but until those are tested, we don't know. You learn a lot by doing that, you see if you're in the ballpark, in one place compared to elsewhere that you think is kind of the same. So I think that is quite legitimate and quite typically done.

Andy Dana: I agree.

Andy Hansen: What I'd really like to do with this, since we're running with this, is to do that sort of detailed analysis among the seven or so major rivers that flow throughout the Greater Yellowstone. I think that would really be important. And I think it would reveal that some of these rivers are in fact much richer than others, due to natural underlying controls; and that's sort of relevant to management. Duncan and I talked about an EPA funding opportunity to maybe go that direction.

Andy Dana: I'm not disputing that, all I would say is that, in your report on this study, I'm not sure that you're at the point where you can make those comparisons, yet. And doing so, I think potentially could be misused by me, or by somebody else on the Task Force, or members of the general public, or whoever.

Andy Hansen: We'll definitely heed your words on that. Thanks.

John Bailey: I'm not advocating that comparison, but you eluded to it in your presentation. If you do that, then people are going to make those comparisons.

Duncan Patten: They can't misuse it because you just say "here's this, and this is this, and we've seen these differences." Period. I mean you're not going to say the Gallatin is going to become like the Yellowstone if you do this to the Yellowstone, and visa versa. I mean that's beyond what you're talking about.

Andy Hansen: I think the one place that the comparison is very relevant is it allows us to speculate on the question of "are these riparian habitats in Yellowstone relatively important habitats in the broader landscape?" So, what I really did was say, over in the Gallatin the quantitative data showed that the cottonwoods are the rich habitat there. Now, we speculate: we don't see any reason why that wouldn't apply here on the Yellowstone; we don't know that but we speculate it; and I think that's a reasonable thing for you all to consider. I think that's specifically the context of comparison that's important to this study. This discussion helps allow us to put a finger on what, in my mind, I think are reasonable or important comparisons for the deliberation that's happening here.

Karl Biastoch: If you continue your study downriver, would you make any changes to your study? Would you try to expand it? Would you use the same methods that you used here?

Andy Hansen: We've been thinking a lot about that due to the initial planning that is happening lower on the river, and we think there are real opportunities to come up with a different study design there. They are asking a very different set of questions, but there's also just a lot more river under a variety of different types of land use. So there's more opportunities to have good, almost controlled treatments of

stabilized versus unstabilized, and rural residential versus non-rural residential, and so forth. So we would expect to change the experimental design a fair amount in that context.

Karl Biastoch: Okay, so then essentially, the data that you gathered here might be used partly but not totally in the next study down river?

Andy Hansen: We need to look very carefully at exactly what are the key issues that we're trying to address in that study, and of course, focus the work to address those. And at the same time, it's always very valuable if you can do a new study in a way that is similar to the previous, so that you can draw comparisons with the earlier study. These are good questions that we haven't yet addressed completely, nor have we made those decisions yet.

Karl Biastoch: Well, I was just trying to figure out whether it would pay to have them come back up here and redo part of your study up here.

Andy Hansen: Well, I think those are good questions that I would like to talk more with George Jordan and the others that have really been developing the scientific investigations for the middle and lower Yellowstone project, and see what we come up with here. At this point, I don't think we know much about, (I don't know much about), what funding is looking like, and who the stakeholders are, and really what the core key issues are. And all that information is really needed to make those kinds of decisions. As a general statement, I think it is great that there are folks from Billings and elsewhere that are really trying to promote that lower river study. And if they are diligent in coming to these meetings and learning what has happened so far, so that they can take advantage of all the benefits from the work that we all have done here, their study will be even better. Hopefully, with their hard work, we'll get closer to having these be compatible.

DeWitt Dominick: Did your meadow habitat type differentiate between agricultural land-use meadows, pastures versus a native or natural meadow? And if so, did you see any major changes in the aerial extent of these types of meadows through time?

Andy Hansen: We had no cropland, and we probably had some that was hayed later on. By and large, they were non-agricultural grass meadows. They were all grazed of course, but no cropping and no haying that we know of; no haying while we were sampling.

DeWitt Dominick: So with the historic mapping, did you see any major change in the extent of agricultural meadows? Basically, did you see woody shrub communities being converted to pasture or to ag?

Andy Hansen: From the air photos, we weren't able to actually see the understory and so we didn't actually classify shrub versus herbaceous for the mature cottonwood.

Danielle Gryskiewicz: If you're talking about the open meadow, we couldn't tell the difference between agricultural practices at all. It was just basically herbaceous, so we couldn't really get at that. We couldn't tell that. I can say, for the braided or moderately constrained (the two regions we looked at), the meadow was very stable across time, so conversion of meadow to shrubland isn't evident. But we can't tell within meadow if there's been change.

Andy Hansen: It's an important question you've asked. Within the cottonwood forest, we really don't know about change in shrub communities through the aerial photo analysis. Now, Monica's study on historic land use, which I'm a Principal Investigator on as well, it got up out of the flood plain, out of the active channel into the uplands. And she has some interesting data on the extent of agricultural land use and how it has changed over the last 50 years or 30 years or so. She presents to the Task Force a month from now, on March 25.

Bill Moser: Back to the design of your study, could you address this 10 a.m., it seems to me that if you have a cloudy day, the bugs are a lot more, and if you have a hot day, the birds are out less, and so

you're depressing your sample size or inflating your sample size by going to a time rather than to a temperature or a humidity.

Andy Hansen: Good point. We sample early in the morning because that's when the birds are actively singing to defend their territories and when the sampling method is most effective. That ten o'clock time is not ironclad. Instead, we basically use the behavior of the birds to guide when it's time to stop. On a hot day, we'll stop the censusing earlier than on a mild or overcast day. We do what we can to try to maximize sampling during the period of active singing. I think we do a reasonably good job of that, and then again, we go back three times each year, over two years. Because if we made a mistake and we didn't quite get it right for one census, then we're going to be back a total of six times over that two years. Again, to try and randomize any error that we might have made. These census techniques have been used hundreds to thousands of times around the country and have been tested in quite a variety of ways; so I think they're pretty strong.

John Bailey: I'd like to thank you very much. I'd now like to move in to our general discussion session, which might be quite interesting if you want to stay; you're welcome to stay. I appreciate it very much. Thank you.

4. General Discussion Session

John Bailey: Roy, you wanted to start the discussion. You had a question for me, I believe.

Roy Aserlind: The question for you was, when it comes time for the recommendations, will we have any kind of direct access to the researchers themselves? We will have the data, but what about the researchers themselves, for incidental questions that come up?

John Bailey: We'll have access to the TAC, which probably has access to the researchers. We can ask a researcher to come back, but they're not under any obligation to come, contractually. They've come to many, many functions that they were never paid for in the past, functions that were not part of the contract; so I think the amount of support we've had from all the researchers has just been incredible. The TAC keeps asking us to give them questions that they can deal with, and we haven't done that yet.

Roy Aserlind: As a comment then, I'm totally impressed with the quality of the researchers and their work. I'm truly impressed. Another thing that is, I guess in the form of a general comment, is it's very revealing to me to start seeing these various elements come together. For instance, the presentation tonight was based on geomorphological structures and everything I think is blending well. Again, I'll quit by just saying "I'm impressed."

John Bailey: Which leads me into what I wanted to start with here, and that is: these studies are coming in and they seem to be implying that the Yellowstone is in very good shape. I want to play the devil's advocate because it seems to me, with the bird study, if I want to build a lot of riprap or build a lot of bank stabilization, I could say, "Well, it hasn't changed in these 50 years and a lot's been done, so how can you stop me Corps?" You know there's really nothing here. I bring this up because it seems to me that this is going to be the Task Force's hardest problem when we're trying to make recommendations. Because we certainly have people on the Task Force that want to protect more land, and those who may not think we have too much out there. How are we going to create standards or suggest when we cross lines? I don't know? It seems to be coming, and Chuck Dalby said that he didn't think the river was really moving that much over time, and that's why we have these old cottonwood stands. Again tonight, look at that 50 years, and especially these two major floods, the old cottonwoods are still the highest amount. So, there's this sense that the river is not moving a lot, I don't know how we're going to cope with all this, or how we're going to make recommendations, when a lot of the data that's coming in is pretty good. The reason I think we are here is, a lot of us thought the river was threatened, and we didn't quite know what these threats meant. Now it comes to my mind that how are we going to wrestle with this issue? So I throw it out there.

Roy Aserlind: Well, you stated, and it seems to be the general consensus, that the river is in pretty good shape, if I can use that euphemism. If we could also say, well, we've a pretty good status quo, and I think one

of the bases for recommendations will then be, to what extent will this change the status quo? And, a comment that I would like to make too, I felt it was very important, that was presented tonight, was the impact of the Yellowstone River on ecosystems 50, 60 miles away on recruitments for trees and animals and birds. And another comment that I think will come up, and I won't say the hottest, would be the presentation tonight mentioned the impact of the irrigation systems on the Gallatin River, and this is something I think that we're going to have to come up with some kind of a recommendation. Future irrigation systems and plants; and see what it's impact is going to be in the future.

Andy Dana: I guess my reaction to your comments, John, is that what we're learning should be no surprise to anybody. We've got a very complex and dynamic river system that we're not going to know where the lines are crossed. We're never going to know that. The Corps is not going to know that from these studies. We can't push the science too far. The best that we can do is recognize that we have a system that is in generally good shape, and that we want to preserve the good aspects of it to the extent that we can. Recognizing that every specific project isn't going to push the system over the edge, but if we have a number of projects that are proposed, we need to look at the various dynamics of all those projects. To me, it says that we've got a lot of latitude in shaping recommendations; but they're going to be general and broad recommendations, which probably won't apply very well to site-specific issues. And I don't know that we can grapple with the site-specific issues in this forum. I also think that we should caution the Corps and some of the other regulatory agencies against taking some of these studies too far, because they are limited studies that can't be extrapolated beyond the science.

Roy Aserlind: Another comment too, I don't know if it's premature or not, but again I come back to the basic geomorphological structure, which seems to add a basis for almost every other single one of the studies, and I think these we will have to look at very carefully. I don't see a lot of recommendations for riprap and barbs done in the entrenched sections, but the braided sections, these are the ones I think will merit most of our attention. In other words, I think those structures are going to be the independent variable on which we will have to base many of our comments. Now remember, what I'm saying is all very premature, but at least it's a frame from which I'm starting my thinking.

Dave Haug: I guess I'd like to maybe go back and reference what Chuck Dalby was talking about earlier. I was almost starting to form my own ideas when looking at charts from 1948 to 1998; we've in essence seen no change. But then Chuck brought out the fact that the 1996/1997 floods, probably the effects from that haven't really been seen in change of vegetation, so this may very easily change 20 years from now. What may happen as far as habitat is concerned?

Duncan Patten: Yeah, if I were to pick up on what Chuck Dalby was saying, I'm going to put words in your mouth Chuck. But I don't think Chuck was implying that we haven't seen the changes in the vegetation because of the 1996/1997 floods. What we aren't seeing is the consequence of bank stabilization as a result of the floods, which may well take 20, 50, 100 years before we see the consequences of bank stabilization. Because basically what bank stabilization does is disconnect the river from the flood plain, but you don't see that with the plants that are still there—the mature deep-rooted plants. And a lot of other things are going on as well. The questions that keep coming up are: what is the threshold? When do we reach some point? Well, I don't think from the data we've heard, that we can predict that point. We can make predictions of possible changes, based on what we're learning, but predicting some threshold point is going to be, I would say, damn near impossible. Therefore, do we want to even test what we're learning by saying "well, it's okay, it's not okay"? Basically it's what I used to kid the students about: people used to argue about we're going to have nuclear winter, or nuclear fall; and I said, well, we could always do an experiment, have a nuclear war and find out who was right. Well, I'm not sure this group wants to do the experiment to see what it takes to finally change the river to the point where it's "unhealthy".

Dave Haug: That's exactly what I meant, is the riprap and the effects of that, as far as we know, good or not?

John Bailey: Mike Merigliano came in with these very old cottonwoods, which they were surprised by, because they thought the river was moving more, should be moving more. We seem to be getting more and more stable. I mean this one, after the two floods, we still have the old cottonwood stands. I would have thought they'd be less now after these two major floods. So it seems like the river is not moving the way we

think it would be moving, and therefore our recommendations are going to be based more on this, at least in my mind. I just look at those flood plains, and assume, you know, I don't know what kind of time it takes for change, but most years it's not moving greatly, it's only in these big events. So, we're going to have to distinguish in our recommendations, things that are dealing with these sort of normal years; where the river is just bank full, versus these 100-year events. We looked at two 100-year events back to back because that is what started this. I think Duncan made the comment that we may have more of those because of the way the climate's changing; but I think, as far as recommendations go, we've got to distinguish between what a normal bank-full event is for most of the years, versus these big events.

Roy Aserlind: This is going to be a facetious comment, please excuse me. But all of these discussions, I've been currently looking at the snowpack on the Upper Yellowstone, and thinking I'm going to save myself $1,500 bucks for flood insurance; but believe me, I'm going home tomorrow and take it out again.

Chuck Dalby: I just want to make a quick comment based on what Roy said. About 10 years ago, as part of an environmental analysis that we did for a program to modify the snowpack at Bridger Bowl using weather modification, we looked statewide at the factors that have contributed to some of the largest floods of record. And it was surprising to find out that some of the largest floods of record in all the Montana drainage basins can occur with minimal snowpacks. You don't get a very long duration flood, but you get a very short peak and it's typically rain-on-snow that takes the whole thing at once. I guess, if you have an average snowpack, you might not want to do flood insurance. If it's really small or really big, get extra.

Andy Dana: One thing that I've been wondering about and hasn't really been addressed by any researcher that I know of—maybe Chuck has some data on this but—in some of the areas where there has been bank stabilization (our ranch and across the river at DePuy's and O'Hair's is what I'm thinking of), the bank stabilization is very well separated, you could not characterize the river in that reach as channelized. And I wonder whether the Task Force can look at the setbacks from bank stabilization—laterally across the channel—and still allow recommendations for bank stabilization that keep these systems functioning, keep cottonwoods growing (not by clonal activity but by natural reproduction), still protect property values, and still protect quality wildlife habitat. Just something to throw out there.

Brant Oswald: I guess one of the things that I want to bring back up, and I think maybe touches most directly on the comments that you were making. Thinking back on the genesis of the Task Force, one of the things to think about is the sort of recommendations that we're going to come up with. I don't think it was so much that necessarily the public saw in the two big flood years, and maybe even in the building of the bank stabilization projects after that, that they saw immediate disaster. But instead, and it's the thing that I've talked about in previous meetings, one of the things that we have seemed to be shy about talking about is the whole idea of planning, and to me what this really brings back to me is the concept of cumulative impacts. That we don't want to get to the threshold where we have a disaster. I think the sorts of recommendations that we're going to come up with are going to be the sorts of recommendations that we can base on the science that we've heard, even if it's going to be relatively limited in some cases. For example, tonight we know that wildlife population richness and diversity is tied to habitat richness and diversity. At least some of the recommendations we can make are going to be the sort of recommendations that we'd hope that stabilization projects would be based on ways that we can maintain some of that habitat. So I don't think necessarily we have to have a disaster. We can look forward, and based on some of the science we've seen, make recommendations on how to maintain the integrity of the system, instead of having to wait for us to cross that threshold.

John Bailey: How would you propose to ask the TAC to try to determine what the thresholds might be?

Brant Oswald: I don't think those are the sorts of questions that we need to ask the TAC. I think one of the questions, as a matter of fact I had a long discussion with somebody about this last week, that wanted the concepts that we've talked about, and it came back to me during the discussions tonight, that one of the buzzwords that I know a lot of the researchers have been hesitant to use is the idea of "river health". That having some sort of way of addressing that, and I realize that's a really broad term and in a lot of cases the studies don't speak directly to something like that. Some of the sorts of questions though that we need to ask the TAC—and I have been thinking that we haven't asked the TAC enough questions to this point—are exactly questions like that. What sort of conditions do we look at on the river? If we're saying right now that we think

that the river is in relatively good shape, how are we determining that? What are the criteria that we're going to use to say that things are reasonably okay now, but we're afraid that they might get worse? I think once we see that criteria the scientific community can respond. I mean, I'm thinking on other kinds of resource issues where we have things like Best Management Practices, where we could look at what contributes to Best Management Practices, there are things you don't want an ag producer to do, and there are things that you encourage ag producers to do. Again, I think those are the things that we need to turn to the TAC more and ask what sorts of criteria we really need to base that on. If we're going to make recommendations that hopefully will be listened to by the permitting agencies, I think those are the sorts of things we can focus on. The permitting agencies have sets of criteria on how they certainly approve or deny permits, and I think some of those are the sorts of questions we need to ask. Again, looking at the science, and looking at some of the studies, where did those studies point us in terms of figuring out what's important for us.

Duncan Patten: Let me address that just briefly. I'm involved with a couple other indicator studies around the West, and in both of them we've looked at riparian condition and stream condition, basic associated stream condition, as an indicator. And the question is, what do you measure for riparian condition? Some agencies use what's called "proper functioning condition", which has a series of more physical parameters and things of that kind. Others have tried things like hydrogeomorphic measurements, which is a very complex set of indices and things like that. There's probably still in the development stage some kind of set of indicators that tell us something about, in small letters, the "proper function" of the river. But that's what you're really looking at, is the functioning of the river, the functioning of the riparian systems, the integration of the functions of those two. There's a series of things you can look at that tell us whether they're functioning; say they're on all cylinders, or only on a few cylinders, or something of that kind. And then maybe that's the kind of thing you're looking for, but there's some question about, even in the ones that are being used by agencies now, as to whether they're the appropriate indices. I think other people are trying to come up with index of riparian integrity, and index of stream integrity, and things of that kind. There is an index of biological integrity for streams, but that's dealing mainly with macroinvertebrates, and some things of that kind. So, I don't know if that answers your question, but when we talked about health, we're really talking about the functioning of the system, relative to the whole.

Roy Aserlind: If I could make a comment then, it's a question really. The last six or seven years, I've heard these stories come out of Jackson Hole, Wyoming, and the Snake River. And if I were to look at those stories, they have passed the threshold. Would any kind of analysis help with that? The extent, the number of permitting, the number of private residences, what has caused specifically the degradation in the Snake River?

Duncan Patten: They've channelized the river essentially, they diked it. They've given it a little bit of flood plain and then built dikes, so you could build houses, for 12 miles, $5 million houses.

Roy Aserlind: We won't do that here.

Laurence Siroky: We've been talking about riprap and revetments and stuff like that, but the other part of the flood plain we often have to look at in floodplain permits is the function of the flood plain itself. Not the floodway (the center section of the river) but the area outside the floodway called generally the flood plain. There is a certain amount of encroachment that's allowed in our state, a lot of the ordinances, and when that encroachment of the flood plain or the base flood elevation is computed, it's based on a half-a-foot. Ellen can help me here.

Ellen Woodbury: Yes, half a foot.

Laurence Siroky: A half-a-foot encroachment is allowed, and if the development increases the base flood elevation beyond that, then it's not allowed. That's the threshold that's used in the floodplain industries. Now, the county can adopt something more stringent than that, they can say zero. And in Park County here, you're not allowing subdivisions in those floodplain areas now, to avoid those kind of progressive encroachments.

Ellen Woodbury: A house will not raise the flood elevation a half a foot in a flood plain, if you are not in the floodway (in areas that we have designated floodways). But if you can get your septic system out of the flood plain, you can build a house. In new subdivisions, we make you have an acre out of the flood plain, and don't

let you build the house in the flood plain. But in the old subdivisions and the old 20-acre tracts, there's an awful lot of those that aren't currently built on.

Laurence Siroky: I guess to clarify that further, the person building that house, the floor level has to be a foot and a half above base flood level.

Ellen Woodbury: That would be two feet above your base flood elevation.

Laurence Siroky: Two feet in this county, above the base-flood elevation. And so, whether it's fill that goes in around the house doesn't necessarily fill the whole flood plain. But eventually you get more houses than that in the flood plain, which has been the relief for floods, it gets filled in. And that's the threshold that we've got established now. But eventually that base flood elevation will be reached, once that flood area is filled in.

Chuck Dalby: Several of you have brought up the question of thresholds and how do we define these, or are they in fact definable, is that something that we should pursue? If you saw the USGS Water Resources Division presentation, in their analysis they did some hydraulic modeling where, for a test reach. They experimented with the amount of channel constriction, lateral constriction and confinement, and the effect that confining what would otherwise have been overbank flows into the channel, and using the sediment transport model, could estimate the amount of material scoured out of that reach and, to an extent, it's fate downstream, where it is deposited. There are some tools to look at and analyze some site-specific effects. With respect to geomorphology, we can do the same thing. Like the classic geomorphic thresholds is that you start with a straight channel, and you can do this in a flume, you start tilting the flume, and as the slope on the channel increases, eventually you reach a threshold where the bank material is not competent to constrain the channel to a single thread, and it braids. Those types of thresholds are more difficult to model and predict, but one of the things we're trying to do in our historic channel analysis is look back through time and see if we can find examples where a particular channel reach may have been reveted or constrained, and that led to downstream channel changes that can be attributed back to that. But once again, it's very difficult to do that kind of analysis unless it's tied to reach-specific channel characteristics. We may be able to do some kinds of generic analyses that would suggest thresholds for certain channel types. I don't know if that'll be successful or not.

Jim Barrett: I just wanted to make a comment about the two different approaches to this whole idea of river management. The one is to see how far we can push it, what can it take, how much can we encroach upon the river, and then look for a threshold somewhere. And another approach might be from all the science we've been able to participate in, what is the river itself capable of, because we can look at the last 50 years and say that there is not change in the last 50 years, but what was it like 100 years ago? The whole idea of what a healthy river is and so on. But maybe you'd rather look at the river from the standpoint of we know what it may be capable of, and how we nurture that, rather than looking at it from the approach which I, perhaps the Task Force was charged to do, is how far can we encroach on it? Maybe not, but with what kind of premise are we going to allow to further encroach on it.

John Bailey: I'd like to comment. The makeup of the Task Force, and the fact that we use consensus means we're going to have some people who may want to do things—I don't know that we have anybody that wants to take it to that threshold per se, but there are certainly people on the Task Force who represent wanting to still be able to do permits. There may be some people who don't want any more permits, I think we've gone there. Consensus is not going to allow us probably to go to either range, with the makeup of the Task Force. We certainly weren't charged to try and find out that threshold. Consensus drives us, I don't know where we end up, it depends on what the data will lead all of us to agree on. You have to remember the makeup of the Task Force is consensus so you aren't going to get the result that a group you might represent would do, because you'd have like people, but we certainly don't have an agenda set. We set our agenda to let science lead us, and let's see what we can do with the science. One can speculate when you see some of the science, how some one individual might want to use it.

Karl Biastoch: In the data presented tonight, and the riparian vegetation data that was presented before, there's a timeline on the river of somewhere between 40 to 300 years to reach the maximum size cottonwood trees. Which means that to have this river really function correctly, you're looking somewhere at a higher level than what they have been using for riprap. This has to be somewhere up around 300 years, if the river is going

to be moving back and changing trees all the time. The seral stages that it goes through to create cottonwoods can take anywhere from 100 to 300 years to be replaced. You lose a tree, it may take 300 years before that tree is replaced again, because it takes that long before that tree may be wiped out by a flood. Tree age, and where the river works, seems to be at a higher level over a longer period of time than we're actually looking at, we're talking about and trying to do. Do we want to put riprap in at, say, a 100-year level, when it should maybe be put in at a 300-year foot level?

John Bailey: We have some other things to discuss. We can go on with this discussion, I think it is good. It is 9:50, just to question how long everyone wants to stay. Would you like to move on?

Dave Haug: I've got one quick comment. We've talked about this river health a number of times and I think everybody is going to have their own definition of this river health; whether you look at it from TMDL's or possibly fish habitat needs. There's no doubt we'll stir things up. And every one of us is going to argue a different way on what we consider a healthy river, whether it's a river that's going totally out of control, tearing everything up, to one that is totally clear from everything being modified. That's just a comment.

Bill Moser: It's very difficult to sit here and watch slides for three or four seconds and then absorb what is actually on the slide, but it appeared tonight that the 1948 versus 1999 pictures were not apples to apples at all. If you, I don't think these people have seen the USGS flood chart, and if you go back to an equivalent of the 1996, 1997 floods, you're in 1918, and you subtract that from 1948 and you find yourself in the second tier of the seral ecological stage. And I believe that if you did any type of mathematical correlation, you would find that the diversion between the second level and the 1999 information would be substantially less than what it showed in the actual numbers that they showed. In other words, the continuity of the diversity, if you are comparing two similar years after the big flood, would be more or less astounding in the second layer.

John Bailey: One of the reasons we have open discussions is to learn the limitations of any of the data. So that as it's used further out, or someone tries to misuse it, some of us will know and remind those agencies who might be listening to that person trying to misuse. I'd like to move on if that's okay.

VI. Other Business

John Bailey: There's a bunch of e-mails in your packet, and I really don't want to go into all of the details. But I've asked Liz to reproduce them for you, so when Chuck was here we could give him some direction. They had a lot of information that they still needed to give us, and I was trying to get that study done on April 8th, right after our last research presentation. Chuck came back and said they would not be ready until late May or June. I responded that we would have to move on into our discussion, because—I believe and please correct me if I'm wrong—that this Task Force wants to be done by August. And in order to do that, we have to get going immediately. Now, there are still discussions going on about how that may be resolved, and we don't have that tonight. February 25th is our next meeting, I'll have a better idea by then. But what I want to ask is, do we need a separate meeting to discuss this, because we haven't done it yet, how we want to go about our general recommendation procedures? I have assumed all along that we're going to need this. And if we do, it's conceivable, if you want to meet two weeks in a row, to do it March 18th. I don't know that we need to wait until all the research is in. I'm asking, I want some feedback here so Liz and I at least know how to make some decisions for later.

Jim Woodhull: I would agree with you John, that we do it before we've seen all the data.

John Bailey: Is March 18th a date?

Andy Dana: That's a separate issue, two weeks in a row.

John Bailey: I've assumed that when we get later out, we may be meeting every week of the month. The reason is I'm gone until the 14th of March. I mean that's one reason there was only one meeting in March, was for my travel plans. Now of course if there is a terrorist attack, or a war starts and I can't fly on airplanes, I'm not going anywhere, and then we can have it earlier.

Andy Dana: March 18th is spring vacation at the University.

John Bailey: Well, that's fine. Do you want April 8th? I've been trying to do a meeting April 8th. I was trying to get Chuck then, but I don't believe that's going to happen.

Andy Dana: I don't want to infringe on Chuck.

Ellen Woodbury: Chuck's not coming on April 8th is fine.

John Bailey: April 8th we're going to set up as a Task Force meeting on procedures.

Liz Galli-Noble: Okay. I think I will send out in advance what we've already agreed upon as a draft, so people will be able to read that in advance, and be reminded of just where we are at this point. We don't have to stay there, but just so you come prepared.

John Bailey: Then, if Chuck is not capable of coming back April 22nd, we'll say, that's two weeks later. Then, does the Task Force want to start in on a general discussion of the final recommendations, or do we wait until we've heard from Chuck again?

Andy Dana: I'd vote for going forward, starting the discussion, and trying to come up with recommendations.

Brant Oswald: I would agree. I think the earlier we get started, even if we have to base that discussion on the sort of information we still want to hear, I think the earlier we get started drafting recommendations, the better off we will be.

John Bailey: That is the assumption I've been going on, and I wanted it at least open publicly so that depending on anything you've heard, we know what's going on. I'll use that as my direction, as we try to figure out how to lay out the rest of this. Are there any more issues?

Laurence Siroky: How's the 29th, instead of the 22nd? I'm out on the 22nd.

John Bailey: We can do that. I think we're going to be running into some every week meetings. Well, we're going to have a meeting the 8th.

Liz Galli-Noble: I will interject something. Given the size of the minutes and bulk mailing, we should have, if at all possible, two-week intervals. Otherwise, Kelly and I kind of rip our hair out to get it all done. So, I guess the 29th would be better.

John Bailey: April 8th and April 29th. It might change in two weeks. There should be much more information by then. So if there is no other discussion, we're adjourned.

V. <u>The meeting was adjourned at 10:00 p.m.</u>

Tuesday, February 25th, 2003—Fish Habitat Study Research Presentation
Location: Yellowstone Inn

Tuesday, March 25th, 2003—Historic Watershed Land Use Study Research Presentation
Location: Yellowstone Inn

Tuesday, April 8, 2003—Recommendation Process
Location: City/County Courthouse, Community Room (basement)

Tuesday April 29, 2003—2nd Geomorphology Research Presentation
Location: Yellowstone Inn